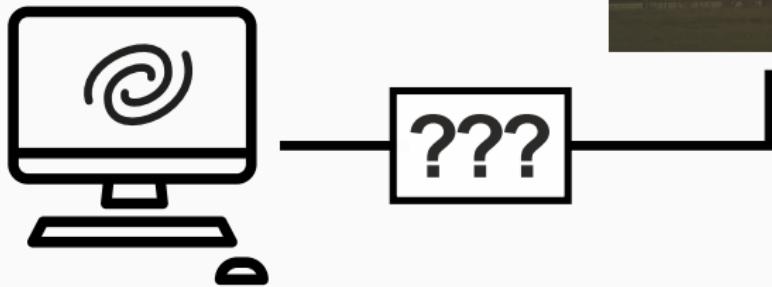
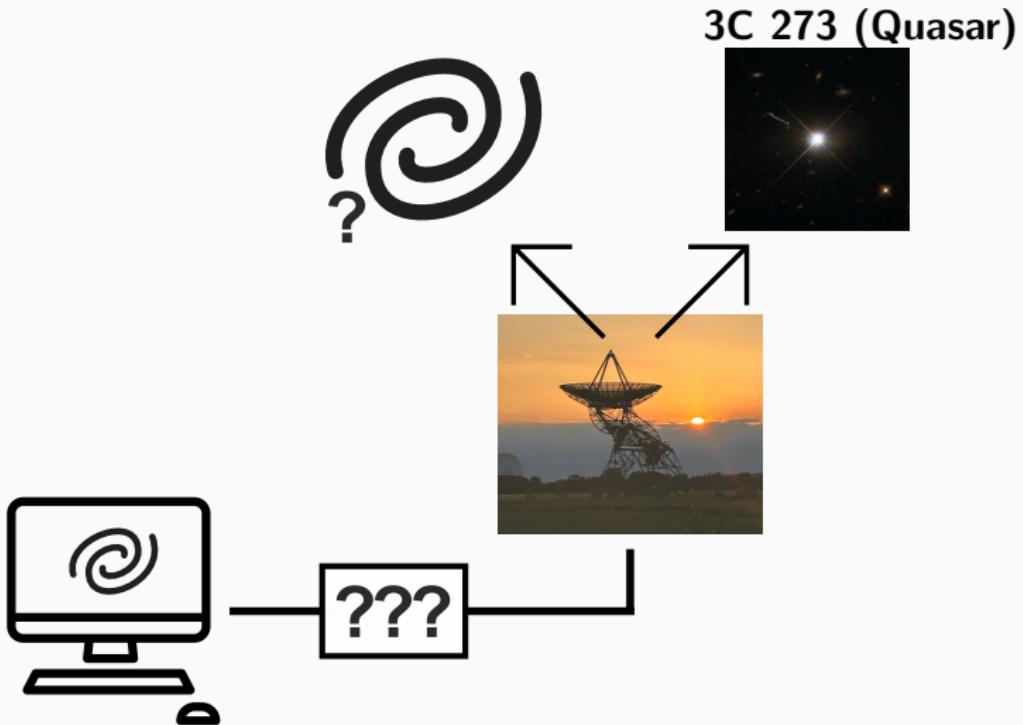


What is calibration in Astronomy?



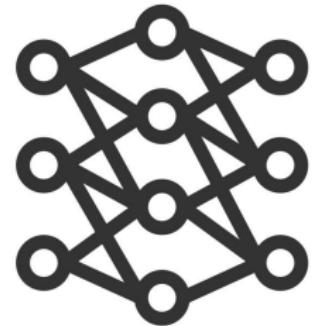
How to calibrate?



Co-authors: Harry Bevins, Will Handley, Eloy de Lera Acedo, Jiacong Zhu, Kaan Artuc, Daniel Molnar

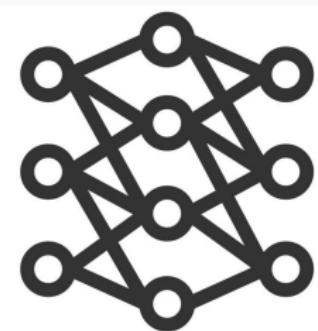
Why is machine learning helpful?

Train

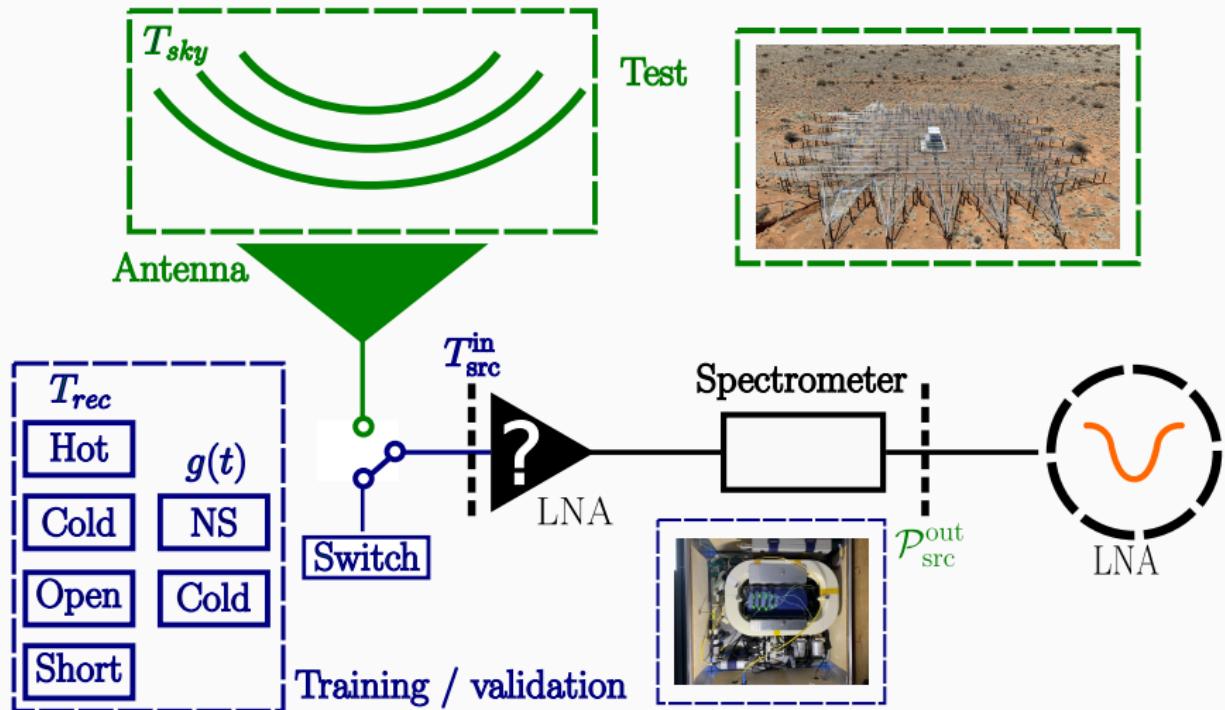


Predict

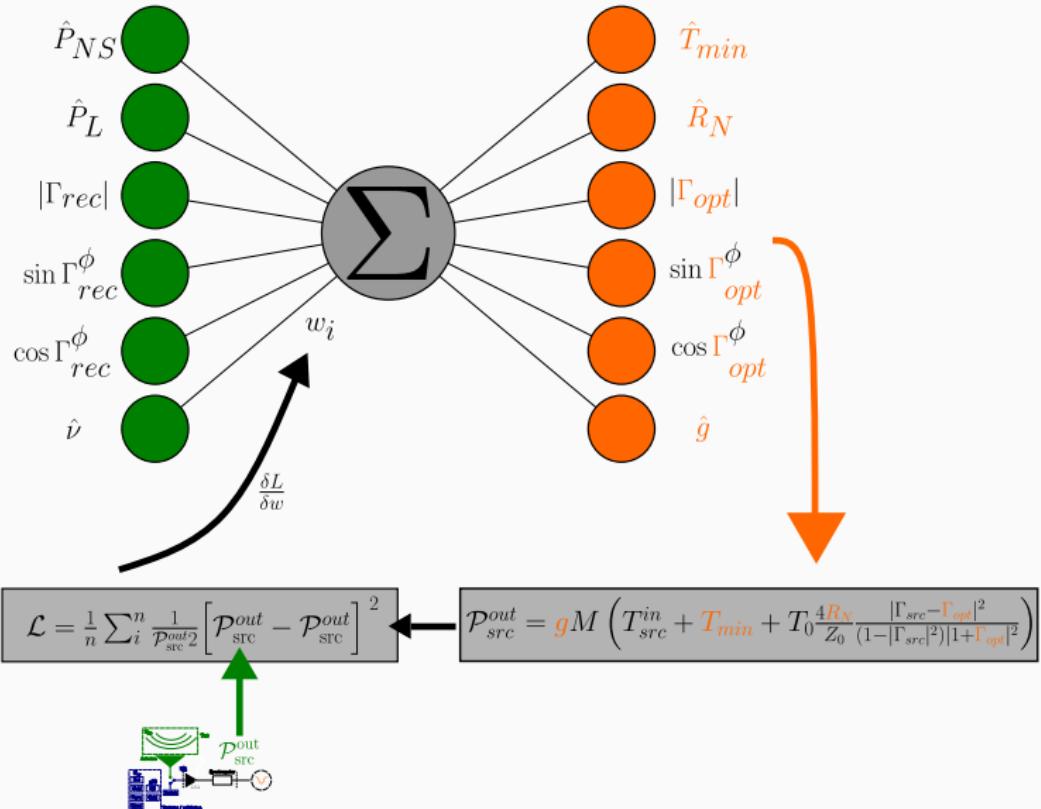
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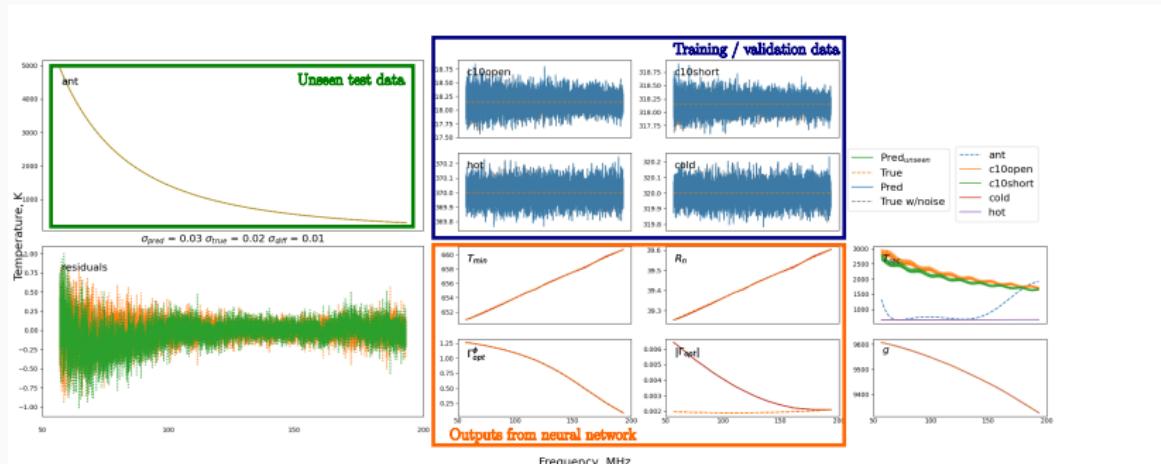
Machine learning for radiometer calibration in global 21cm cosmology



Machine learning for radiometer calibration in global 21cm cosmology



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Machine learning for radiometer calibration

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We propose a Physics based AI framework for precise radiometer calibration in global 21cm cosmology. These experiments aim to study the formation of the first stars and galaxies by detecting the faint 21-cm radio emission from neutral hydrogen. This global or sky-averaged signal is predicted to be five orders of magnitude dimmer than the foregrounds. Therefore, detection of the signal requires precise calibration of the instrument receiver, which non-trivially amplifies the signals detected by the antenna. Classical approaches are challenging to apply in this high precision regime, causing a major bottleneck in all such experiments. Unlike other methods, our receiver calibration approach is expected to be agnostic to in-field variations in temperature and environment and furthermore does not rely on assumptions that certain critical components are impedance matched. For the first time, we propose the use of machine learning for calibration of global 21-cm experiments.

